

4TH ANNUAL AMERICAS SPECTRUM MANAGEMENT CONFERENCE
KEYNOTE PRESENTATION
FCC COMMISSIONER MIGNON L. CLYBURN
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Introduction

Good morning. What an honor it is for me to join you again. In just a few short years, this conference has become a key venue for serious discussion of spectrum issues in our region and I would like to thank Fernando Carillo for his introduction and Forum Global for inviting me to give an update on recent spectrum activities at the Federal Communications Commission.

Spectrum management has never been more important than it is today. Once seen through a narrow, technical lens – it has become a central part of our national policy – critical to economic growth, social development, and our day-to-day lives.

The growth of wireless technology in recent years has been, in a word, breathtaking and spectrum is the essential ingredient – the life blood if you will – that allows these technologies to continue to grow and flourish.

We've all seen the numbers . . .

- Cisco Systems reports that global mobile data traffic grew by more than 80 percent last year alone.
- And it's predicted that, in just three years, the world's mobile networks will have to carry almost *16 billion* gigabytes of data each month.
- The number of mobile devices is also growing rapidly and, by the end of this year, there will be more mobile devices worldwide than there are people on earth.
- By 2018 there will be over *10 billion* mobile-connected devices including machine-to-machine units.

And the demand for spectrum is a matter of concern for *all* countries with demand growing most rapidly in emerging economies.

So how do we meet this extraordinary challenge? By employing an all-of-the-above approach. This means looking at both licensed and unlicensed use, exclusive use, and sharing. It means finding ways to free up federal spectrum for commercial services. And it means taking advantage of some exciting, cutting edge technologies that allow us to tap into the enormous reservoir of spectrum available in the millimeter wave bands, which start higher in the spectrum bands, at 24 gigahertz.

U.S. Approaches to Spectrum Management

In the United States, the need to make more spectrum available for mobile broadband is being addressed at the highest levels. The FCC released its National Broadband Plan, in 2010, making us the first country to develop a broadband plan that focused on mobile as well as fixed broadband.

The Plan and a subsequent Presidential Directive both called for making an additional 500 megahertz of spectrum available for wireless broadband use, within 10 years, 300 megahertz of which should be made newly available to wireless broadband by 2015, on either an exclusive or shared basis. This was an aggressive goal, which involved almost doubling the amount of spectrum, the U.S. had available for broadband use, at that time.

We've made some additional spectrum available, through traditional means, such as removing unnecessary restrictions in our rules, allowing flexible use, encouraging efficient use of the existing spectrum holdings, and holding traditional spectrum auctions – and we plan to continue to use these tools going forward.

The FCC also sets initial build-out and performance requirements for licensees with some real teeth to help ensure that spectrum is actually being used to provide service.

But these traditional approaches alone will not be sufficient to meet the extraordinary near term growth, in demand for additional spectrum. New strategies are needed, and in the U.S., we're currently focusing on three additional approaches to make spectrum available for mobile broadband, which were discussed here yesterday. Voluntary incentive auctions, spectrum sharing, and unlicensed spectrum.

In addition, you will be hearing more about how we are starting to look at the exciting new possibilities, offered by the next generation mobile technologies, including 5G, and how we are actively working on preparations for next year's ITU's World Radio-communication Conference.

(1) Voluntary Incentive Auctions:

The world's first voluntary incentive auction is an innovative, market-based means, to allow spectrum used by TV broadcasters to be repurposed for wireless broadband. We issued an order that set a framework for the two processes – a reverse auction and a forward auction, and established the technical rules for the 600 MHz band plan, that wireless carriers will use when deploying spectrum they acquire.

In addition, the order set important rules about how the Commission will reassign channels to any broadcast TV licensees, who do not choose to give up their spectrum. It also made clear that we will use all reasonable efforts to protect broadcasters' coverage area and the population served.

We are also considering rules to address potential interference, between broadcast and wireless services and rules, for unlicensed operations, in the reconfigured broadcast TV band. We are considering rules to afford small businesses a meaningful opportunity to participate at auction and in the provision of spectrum-based services. Finally, we are undertaking extensive outreach efforts to provide broadcasters with the information they need to make decisions about participating in the auction.

We believe the Incentive Auction will provide a model that may be used by other countries as well – and not just for the broadcast bands. This approach could give appropriate incentives to *any* incumbent licensee, to give up its spectrum, in exchange for compensation.

(2) Spectrum Sharing:

Second, we're placing new emphasis on spectrum sharing. In 2012, a Presidential advisory council issued a report stating that sharing should be the norm and could multiply the effective capacity of spectrum 1,000-fold.

The report also found that recent technical innovations, including small cells and improved device performance make this approach eminently achievable and the development and use of a dynamic spectrum access system.

Just today, the FCC launched an auction, of 65 megahertz of highly desirable spectrum in the AWS-3 band for flexible commercial use and the winners will be required to share some of this spectrum with Federal government users, in particular geographic areas. Sharing is critical to freeing up this spectrum for commercial use.

In April, the FCC issued a notice proposing to make 150 MHz of spectrum in the 3.5 GHz band available for commercial mobile broadband, using innovative spectrum sharing techniques. The proposal would create a new Citizens Broadband Radio Service in the 3550-3650 MHz band, and seeks comment on extending the service to 3700 MHz. The proposal involves a three-tiered authorization model, consisting of incumbents, priority access licensees, and general access users. Access and use of the band, would be managed by a spectrum access system, and the rules would be flexible, to accommodate a variety of use cases.

The 3.5 GHz band is an ideal test bed for exploring innovative approaches to spectrum sharing and small cell technology and may help us develop a model for sharing that can be used in other bands as well. Our proposal also shows that we are leaving behind the outdated notion that we need to choose between licensed and unlicensed spectrum. Good spectrum policy requires both because the general access users would receive a type of blanket license that effectively operates the same as unlicensed spectrum in that it would be open to all such users in that tier.

(3) Unlicensed Spectrum:

Third, we're focusing on unlicensed spectrum because it has significant economic benefits. By some measures, it's estimated that this spectrum contributes as much as \$140 billion to our economy annually, and helps to reduce the strain, on licensed cellular networks. Recent studies indicate that the majority of traffic that would otherwise be present on the cellular network is already being off-loaded primarily to Wi-Fi in the home. And unlicensed spectrum also helps promote the development of new technologies by allowing for innovation without permission.

The U.S. has already made a substantial amount of spectrum available for unlicensed use, most of which is shared with other radio services on a non-interference basis. Unlicensed use has spawned innovation and creation of many new industries such as those popular wearable health and fitness devices. So we're working hard to free up even more spectrum for unlicensed use.

This March, the FCC adopted an order making 100 MHz in the 5 GHz band more useful for wireless broadband. We removed restrictions requiring in-door only use, and increased the permissible power level, for unlicensed devices operating in a portion of the band. This action will help relieve congestion on Wi-Fi networks.

We've allowed access to the vacant spectrum between TV channels, by unlicensed white space devices, so that this spectrum can be used for new services. Unlicensed devices operating in this spectrum use geo-location technology to determine their location, and a database lookup, to identify unused channels available in that location. Last year, the FCC authorized white space database systems to start providing service nationwide.

The use of TV white spaces is currently being reviewed all around the world, which could lead to a potential global market for white space devices, as the TV band is relatively harmonized.

And yes, we're planning to make additional spectrum available for unlicensed, as part of our incentive auction proceeding, and recently proposed revised rules regarding unlicensed use of this spectrum. These proposals will allow for higher power to better enable the provision of wireless broadband service to rural areas.

(4) Next Generation Services Including 5G Service:

Perhaps the most dramatic development in the spectrum universe is the possibility of using the upper regions of the spectrum - - the millimeter wave bands - - to provide next generation mobile wireless services, including so-called Fifth Generation or 5G mobile service.

While there is no consensus on the definition of 5G, some believe this next generation technology could accommodate a 1,000-fold increase in traffic demand and support high-bandwidth content with speeds up to 10 gigabits per second.

Several countries are starting to look at 5G, and just last month, the FCC released a Notice of Inquiry, that explores the possibility of using frequency bands above 24 GHz – and all the way up to 90 GHz – to provide next generation services including 5G mobile services. We ask about the new technologies involved, what bands would be most suitable for mobile services, how to protect any incumbents in these bands, and about possible service and licensing models.

Today mobile broadband networks generally use spectrum bands below 3 GHz. Until recently, it was assumed that mobile service in higher frequency bands, such as those above 24 GHz, was infeasible in part because radio waves in those frequency bands travel in straight lines and could only provide line-of-sight service.

Exciting new technologies can track and acquire multiple signals reflecting and ricocheting off obstacles in the physical environment and may make the use of higher frequency bands for mobile service possible. These new technologies could open up a vast reservoir of additional spectrum for mobile use.

But the Commission is not trying to define 5G. That's not what our inquiry is about. It is about understanding the state of the art in technological developments to make mobile a reality in higher frequency bands and doing what we can to help these developments succeed. The Commission historically has not defined specific standards or technologies that can be deployed in a commercial wireless band – whether these bands become part of a quote unquote 5G standard is up to the industry.

(5) Physical Infrastructure:

While we generally focus on making more spectrum available, it's worth remembering that carriers cannot meet the ever-growing demand for wireless services simply by acquiring spectrum. They also have to deploy that spectrum using physical infrastructure – which includes antennas and base stations. To meet the growing demand for service, many wireless carriers are turning to new technologies such as small cells and Distributed Antenna Systems. These technologies can offer a number of advantages over traditional macro-cells mounted on the top of large towers and are also a comparatively cost-effective way to meet the increasing demand for wireless services particularly in urban areas.

Because of their small size, and because they do not require the same elevation as traditional macro-cells, small cell technologies can be placed unobtrusively on utility poles, building walls, rooftops and other small structures. In addition, because small cells and transmit signals at lower power levels, they can be deployed indoors, improving wireless service within buildings, where most wireless voice calls and data usage take place.

Finally, small cells can multiply wireless capacity within existing spectrum resources. Because small cells have a significantly smaller coverage area than traditional macro-cells, small cell networks can reuse scarce wireless frequencies, greatly increasing spectral efficiency and capacity. What's more is that all of this reduces the need for wireless carriers to increase the power of their outdoor cell sites.

Last month, the FCC adopted rules, that will help reduce the regulatory burdens involved in deploying certain wireless infrastructure, including small cells and DAS. We noted that some of our original rules for deploying wireless infrastructure can require a lengthy and complex regulatory approval process that is often unnecessary in the case of small technologies. Our new rules will help encourage deployment of infrastructure that will be critical for next generation wireless services, including 5G, while safeguarding critical State, local and Tribal interests.

To make the most out of available spectrum, equipment technology, including equipment for end users, also needs to continue to evolve so that it can sustain higher levels of potential interference. Such advances can include improvements in filtering technology and equipment advances that permit smaller edge bands between services.

International Harmonization & World Radiocommunication Conference in 2015

Lastly, I'd like to talk briefly about the importance of spectrum harmonization and the upcoming ITU World Radio-communication Conference. Regional and global coordination and harmonization are key to getting the greatest possible benefit out of available spectrum. Harmonization helps prevent interference, and makes coordination between neighboring countries easier – an issue we're very familiar with in the United States, given our long shared borders with Canada and Mexico.

I have travelled to both countries to discuss this issue, particularly as it relates to the FCC's upcoming incentive auction, and officials at the highest levels agree on the need for spectrum harmonization, a point confirmed during my recent trip to Canada. Harmonization also allows equipment manufacturers and others, to take advantage of economies of scale when devices can be sold internationally, resulting in lower prices, and a wider range of broadband services and devices.

As significant as the United States wireless market is, the implementation of new broadband services cannot be achieved in isolation. In our view, international spectrum harmonization, particularly with countries in our hemisphere, is an important part of addressing the spectrum needs, of wireless broadband.

That's why we are seeking to work with countries in the Americas to develop proposals for the conference, which would enable regionally harmonized spectrum allocations, to the mobile service in the UHF and other bands. Our objective is to develop regulatory solutions that would encourage the introduction of innovative broadband services while preserving access to spectrum for existing services such as broadcasting. These solutions would provide administrations with flexibility to maximize spectrum use consistent with their domestic requirements.

Conclusion

Spectrum is one of our most valuable natural resources, and making the most efficient use of it is a top priority. Innovative approaches to spectrum management – such as incentive auctions, spectrum sharing, unlicensed use, 5G technologies, and global harmonization – can help to ensure that sufficient spectrum is available to support new mobile services and technologies that will enable and encourage economic growth and improve the lives of people worldwide.

Thank you.